Space Weather Forecast

Issued on Tuesday, 01 August 2023 at 01:26 Local

This forecast provides a four day assessment of space weather events. The probabilities stated below are for reaching or exceeding the given levels. For more information about space weather impacts please see the Met Office Space Weather Scales https://www.metoffice.gov.uk/weather/learn-about/space-weather/uk-scales

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Space Weather Forecast Headline: R1-R2 Blackouts likely, with a chance of R3 (Strong flares). CME arrival expected day 1 (01 Aug) with G1-G2 Minor/Moderate Storm possible.

Analysis of Space Weather Activity over past 24 hours

Solar Activity: Moderate with one Moderate class flare from a small and unremarkable region in the southeast. There are now eleven sunspot regions on the disc, with the moderately sized region in the southeast the most notable, having shown significant growth and increased complexity. The only other region showing notable growth was near the east limb, but this appears to have stablised into a simple magnetic configuration as a series of smaller spots. The other moderately sized region persists as in the north-centre disc, but has been slowly simplifying. All other regions are smaller and simpler.

No new Earth-directed CMEs (coronal mass ejections) have been observed in available imagery in the last 24 hours.

Solar Wind / Geomagnetic Activity: The solar wind showed a transition from fast wind environment from a coronal hole into the background speeds of what is called 'slow wind', falling below 400km/s. The total interplanetary magnetic field strength remained weak with the north-south component also weak but predominately negative (southward). Geomagnetic activity was Quiet (Kp 0-2).

Energetic Particles / Solar Radiation: The observed count rate of energetic particles (high energy protons) was still above background levels after the recent enhancement from the far-side event on the 28 Jul, but are now well below the S1 Minor Radiation Storm level.

Four-Day Space Weather Forecast Summary

Solar Activity: Activity is likely to be Moderate, with a chance of rising to High. This is mainly due to the increased potential for Moderate flares, along with a chance of Strong flares, from the increasingly complex region on the southwest disc.

Solar Wind / Geomagnetic Activity: The CME which left the Sun on 29 Jul is currently forecast to arrive at 01/1000 UTC +/- 9 hours. Solar winds then likely easing to background later day 2 (02 Aug). There is a potential for further coronal hole sourced enhancements to the solar wind late day 3 or day 4 (03-04 Aug) however these coronal hole features are low confidence as they are difficult to observe in SDO imagery. Geomagnetic activity is expected to be Quiet before the CME arrival, increasing to Active to G1/Minor Storm as it arrives with a chance of G2/Moderate Storm intervals. These conditions easing day 2 to mostly Quiet with isolated Unsettled intervals. Any further solar wind enhancement day 3 or day 4 bring further Unsettled to Active intervals with a slight chance of G1/Minor Storms.

Energetic Particles / Solar Radiation: The count rate of energetic particles is likely to continue easing to background levels. The expected CME arrival Day 1 (01 Aug) may give another brief enhancement, with a slight chance of rising just above the S1 level, before easing to background. There is a slight chance of further enhancements from any larger flares that occur, mainly from the complex region in the southwest.

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Geomagnetic Storms:

Geo-Magnetic Storm Probability (Exceedance)	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Minor or Moderate	G1 to G2	No	70	20	5	10
Strong	G3	No	10	1	1	1
Severe	G4	No	1	1	1	1
Extreme	G5	No	1	1	1	1

Radio Blackouts - X Ray Flares:

X Ray Flares Probability	Level	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	R1-R2 M Class	Yes	75	75	70	70
Very Active	R3 to R5 X	No	25	25	20	20

Solar Radiation Storms - (High Energy Protons):

Radiation Storms Probability (Exceedance)	Level (cm^{-2} sr^{-1} s^{-1})	Past 24 Hours (Yes/No)	Day 1 (00-24 UTC) (%)	Day 2 (00-24 UTC) (%)	Day 3 (00-24 UTC) (%)	Day 4 (00-24 UTC) (%)
Active	≥ S1	No	20	15	15	15
Very Active	≥ S3 *	No	1	1	1	1

* S3 ≥ 10 MeV ≥ 1000 pfu and / or ≥ 50 MeV ≥ 10 pfu. (pfu = $cm^{-2}sr^{-1}s^{-1}$)

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